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In 81
107

FOREST CONTROL

by

CONTINUOUS INVENTORY

"Today I have grown taller from walking
with the trees."

...Karle Wilson

Milwaukee, Wis. February, 1963 No. 107

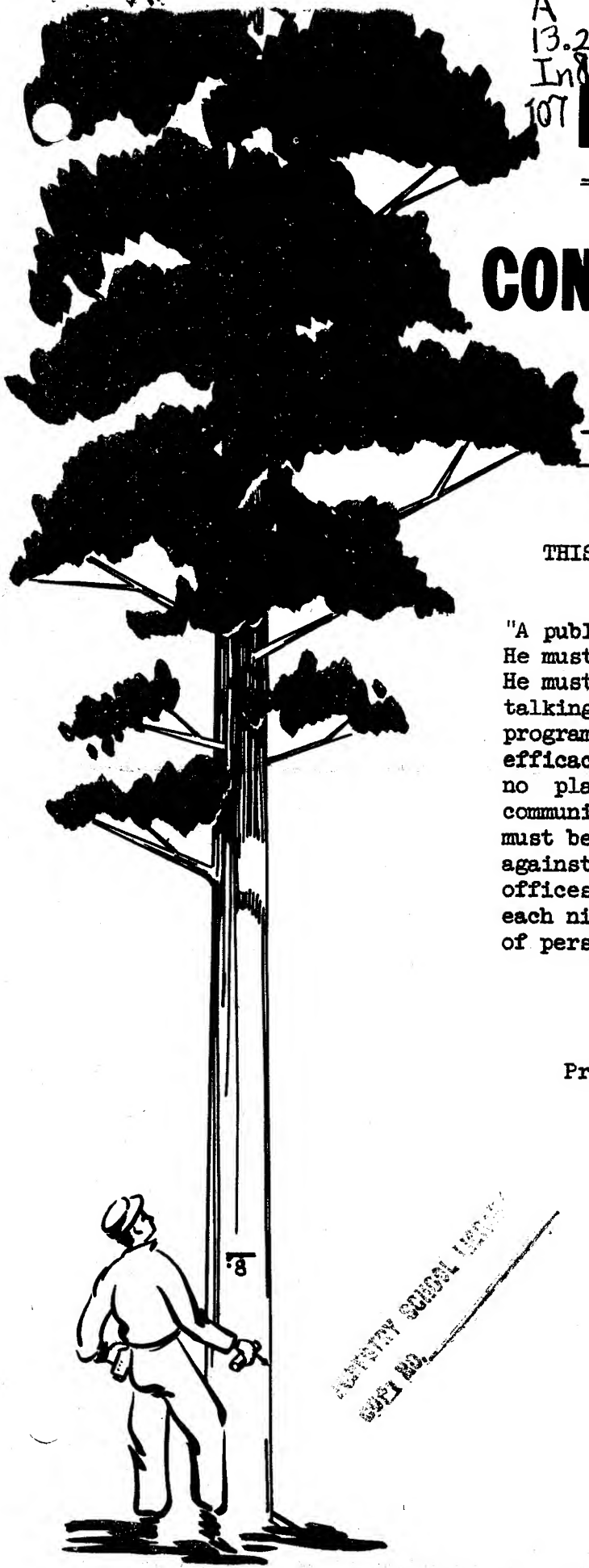
THIS APPLIES ALSO TO PUBLIC FORESTERS

"A public official must want to communicate. He must want to go out and see for himself. He must believe that by listening, not just talking, by seeking criticisms of his program, not merely corroboration of its efficacy, he will best do his job. There is no place for the thin skinned. Two-way communication is the way of democracy. There must be a constant struggle against ennui, against the temptation to sit in our own offices by day and sleep in our own beds each night. We must not assume that the era of personal attention is over."

John W. Lederle
President, University of Massachusetts

From an address delivered
April 24, 1962, at the Annual
Conference of the College of
Business Administration,
Boston College. Reprinted
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FOREST SERVICE
U.S. DEPT. OF AGRICULTURE



COMPONENTS OF FOREST GROWTH BY INDIVIDUAL TREES

Net growth of sound wood in the forest is made up of many parts. These parts are commonly called growth components, and they are both positive and negative. Varying proportions of positive and negative growth components exist in all forests, and CFI at remeasurement time is beginning to dig them out of the data on a wholesale basis.

In Region 9 growth components are segregated for most industrial inventory cases. This is not done merely to add to the detail but to secure a measure of the condition of the forest. The proportionate share of trees in each growth component class gives a picture of the producing power of timber stands.

Heavy mortality is urgent notice of a forest in the declining period of its life. A large share of pulpwood and sawlog ingrowth is good indication of youthful stands. Great quantities of surviving trees or repeaters, and very little mortality or ingrowth, give evidence of an unmanaged forest in its prime.

If put to work, the constituent parts of growth in terms of tree count, or any other unit of measure, can become useful indicators of stand condition, and real helpful guides to the proper treatment of the forest. This becomes more obvious with a listing of the common components of tree growth.

GROWTH COMPONENTS

PROGRESSIVE TREES -- POSITIVE GROWTH COMPONENTS

	<u>Tree Status</u>	
	<u>Old</u>	<u>New</u>
Survivor trees of sawlog status	3	- 3
Survivor trees of pulpwood status	2	- 2
Survivor trees of chemical wood status	9	- 9
Survivor trees of cull status	4	- 4
Ingrowth trees to sawlog status	0	- 3
Ingrowth trees to pulpwood status	0	- 2
Ingrowth trees to chemical wood status	0	- 9
Ingrowth trees to cull status	0	- 4
Ingrowth trees pulpwood to sawlog status	2	- 3

REGRESSIVE TREES -- NEGATIVE GROWTH COMPONENTS

	<u>Tree Status</u>	
	<u>Old</u>	<u>New</u>
Mortality trees of sawlog status	3	- 5
Mortality trees of pulpwood status	2	- 5
Mortality trees of chemical wood status	9	- 5
Mortality trees of cull status	4	- 5
Harvested trees of sawlog status	3	- 6
Harvested trees of pulpwood status	2	- 6
Harvested trees of chemical wood status	9	- 6
Cut or girdled trees of cull status	4	- 6
Trees regressing from sawlog to pulpwood status	3	- 2
Trees regressing from sawlog to chemical wood status	3	- 9
Trees regressing from sawlog to cull status	3	- 4
Trees regressing from pulpwood to chemical wood status	2	- 9
Trees regressing from pulpwood to cull status	2	- 4
Trees regressing from chemical wood to cull status	9	- 4

INTOLERABLE TREES -- ERRORS IN JUDGMENT OR FIELD PUNCHING

Trees progressing from cull to chemical wood status	4	- 9
Trees progressing from cull to pulpwood status	4	- 2
Trees progressing from cull to sawlog status	4	- 3
Trees progressing from chemical wood to pulpwood status	9	- 2
Trees progressing from chemical wood to sawlog status	9	- 3

A FEW WORDS ON INTOLERABLE TREES

Cull and chemical wood trees do not improve in condition with age. Once classified, these inferior trees are carried indefinitely in their original cull and chemical wood status, unless utilization standards change radically.

Intolerables are generally few and of little significance. They are often borderline trees with heavy cull which may be classified either cull or commercial without introducing serious error.

A large percentage of intolerable classifications is the result of mispunching original tree status. Others are due to misuse of the rules for the work or to misunderstanding of standards. When these situations cause errors, the field cards are error punched at remeasurement so that the original decisions may be corrected.

A REFERENCE FOR BACKGROUND READING

A paper entitled "COMPONENTS OF FOREST-GROWTH" has been published in the Journal of Forestry, April, 1962, pp. 245-248. The author is Thomas W. Beers, Assistant Professor, Department of Forestry and Conservation, Purdue University, Lafayette, Indiana.

Tom Beers makes a plea for the use of proper growth terminology in his paper and proposes methods of clarification of growth component problems.

TABULATED EXAMPLES OF GROWTH COMPONENTS

The problem of properly defining and applying the results of growth component compilations to the management of the forest is yet to be accomplished on an intensive scale. Many industrial companies in the North Central Region are now enmeshed in thoughts and studies in this field. Realistic examples of these data are not available on a large scale for many growth periods. It is possible, however, to simulate periodic growth component records with repetitive annual examples. This we have done with individual tree samples selected from 17 years of annual records in Stone's woods. The tables are attached.

CAL STOTT
Forester
U. S. Forest Service
Region 9

Attachments

CODES COMMON TO THE LISTING OF PURDUE PROJECT DATA
LOCAL WOODS --- MILWAUKEE, WISCONSIN
JANUARY, 1963

MEASUREMENT NUMBER

Numerical sequence

MEASUREMENT YEAR

Numerical. When duplicate years occur the first entry is spring, the second is fall.

FOREST

- 1 Shaughnessy's woods
- 2 Stone's woods
- 3 Butler's woods
- 4 Mahr's woods

PLOT NO.

TREE NUMBER

Numerical sequence with occasional omissions.

SPECIES

- 01 Hard maple
- 04 Basswood
- 05 Red maple
- 06 American elm
- 11 Northern red oak
- 14 White ash
- 16 Black ash
- 20 Wild black cherry
- 28 Black walnut
- 30 Shagbark hickory
- 34 Large toothed aspen
- 41 Northern pin oak
- 45 White oak
- 46 Swamp white oak
- 47 Bur oak
- 69 Slippery elm
- 75 Hop horn beam
- 99 Red ash

DIAMETER BREST HIGH

Numerical. Taken annually to hundredths.

USABLE LENGTH

Numerical. Taken periodically to the nearest full two feet for all living trees. Sawlog lengths to minimum 8 inch top dib. Other products to minimum 4 inch top dib. All top diameters flexible.

SOUNDNESS

Taken periodically

- 0 - 100% gross scale of cull tree
- 7 - 97% net scale of commercial tree
- 3 - 93% net scale of commercial tree
- 6 - 86% net scale of commercial tree
- 8 - 78% net scale of commercial tree
- 5 - 65% net scale of commercial tree

VIGOR GRADE (Flash)

Taken periodically

- 1 Tree of good vigor
- 2 Tree of fair vigor
- 3 Tree of poor vigor
- 4 Cull tree less than 50% sound

CFI Newsletter No. 108

VIGOR GRADE (Weighted)

Taken periodically

- 1 Tree of very good vigor
- 2 Tree of good vigor
- 3 Tree of fair vigor
- 4 Cull tree less than 50% sound
- 5 Tree of poor vigor
- 6 Tree of very poor vigor

CFI Newsletter No. 109

QUALITY GRADE (OLD RULES-1942)

Taken periodically. Dropped after Meas. 17

- 1 Grade 1 butt log
- 2 Grade 2 butt log
- 3 Grade 3 butt log
- 4 Grade 4 cull log

QUALITY GRADE (NEW RULES-F.P.L.)

Taken periodically

- 1 Grade 1 butt log
- 2 Grade 2 butt log
- 3 Grade 3 butt log
- 4 Grade 4 cull log

CFI Newsletters Nos. 84, 85, 86, 91

TREE STATUS, PREVIOUS AND PRESENT

Taken annually

- 2 Pulp, cordwood or chemical
- 3 Sawlogs
- 4 Cull trees
- 5 Mortality
- 6 Cut and used
- 9 Trees of sub-commercial length
- 0 Previous tree status at Meas. 1

CFI Newsletter No. 75

MANAGEMENT POTENTIAL

Taken annually

- 1 Healthy trees to be left under a selective cutting practice.
- 2 Healthy trees to be left until area is clear cut.
- 3 Trees to be cut because of epidemic disease or insect infestation.
- 4 Trees to be cut because they are of low vigor, high risk and heavy cull.
- 5 Trees to be cut because they are mature or over-mature although of medium to high vigor and soundness.
- 6 Trees to be cut to effect a thinning.
- 7 Trees that are cull.
- 9 Trees of sub-commercial length.

CFI Newsletters Nos. 82 and 88

SITE QUALITY VIGOR OR TREE GROWTH

POTENTIAL CLASSES

- 1 High growth capability
- 2 Fair growth capability
- 3 Poor growth capability
- 4 Cull tree

Note: Tree growth potential classes were recorded only once in the total growth period.

CFI Newsletter No. 61

AGE OF TREES CUT

Numerical. A stump count on cut trees. Those impossible to count were coded 000. Left blank for uncut trees.

MORTALITY KIND

- 1 Tree uprooted
- 2 Tree broken off
- 3 Tree standing dead
- 6 Tree cut and used for sawlogs.
- I-punch column 44 if cut and used for fuel or fence posts.
- 8 Logging loss or trees cut and wasted.

Note: Trees dead from oak wilt or Dutch elm disease are I-punched in Column 42.

MORTALITY YEAR

Numerical for calendar year.

DBH CLASS

- In two-inch intervals
- 08 6.96 to 8.95 inches
- 10 8.96 to 10.95 inches

FOREST COVER TYPE

Taken each time plots are cut over

- 0 Open. Less than 1500 board feet, or 3 cords, or 100 seedlings or saplings per acre.
- 1 Oak. Predominantly red oak but includes white, bur and northern pin oak, and other hardwoods.
- 2 Mixtures of northern hardwoods with oak and hickory.

STAND SIZE CLASS

Taken each time plots are cut over

- 1 Seedlings and saplings up to 5 inches DBH.
- 2 Poles 5 to 11 inches DBH.
- 3 Small sawlogs 11 to 15 inches DBH.
- 4 Large sawlogs 15 inches DBH and larger.

STAND DENSITY CLASS

Taken each time plots are cut over

- 0 Open
- 1 Light
- 2 Moderate
- 3 Heavy

SITE QUALITY

- 1 Excellent site
- 2 Good site
- 3 Fair site
- 4 Poor site
- 5 Off site

BOARD FOOT VOLUME AND VOLUME GROWTH (Net)

Numerical in Net Scribner scale for trees 10.96 inches and larger.

CORDWOOD VOLUME AND VOLUME GROWTH (Net)

Numerical in net cords for trees 6.96 inches and larger if considered cordwood, pulpwood or chemical wood. Cull trees also computed in terms of cords.

BASAL AREA AND BASAL AREA GROWTH

Numerical in square feet.

LENGTH GRADED

Numerical in 2-foot length intervals for sawlogs only.

FIRE DAMAGE

Taken only in plots 51-75 in Woods No. 2. Ground fire in November, 1953 scorched some butts.

- 0 - No fire damage
- 1 - Light fire damage
- 2 - Moderate fire damage
- 3 - Heavy fire damage

SPECIES FACTORS

Taken from CFI Newsletter No. 65

MEAS. NO.	MEAS. YR.	FOREST NO.	PLOT NO.	TREE NO.	SPECIES	D.B.H.	SAWLOG	CORDWOOD	USABLE LENGTH	SOUNDNESS	CORDWOOD	FLASH WEIGHTED	VIGOR. QUAL.	OLD RULE	NEW RULE	TREE STAN. PRESENT	SO. VIGOR	AGE	KIND	MORTALITY	COVER TYPES	STAND DENSITY	DBH CLASS	GROWTH	VOLUME	BA. GROWTH	BASAL AREA
1	45	2	20	2	11	18.50	36			.97		11	11	11	11	031					1421	18		267.7	—	.87	
2	46					18.60	36			.97		11	11	11	11	331					1421	18		35	.02	.89	
3	47					19.00	36			.97		11	11	11	11	331					1421	20		135	.08	.97	
4	48					19.30	36			.97		11	11	11	11	331					1421	20		101	.06	.03	
5	49					19.65	38			.97		11	11	11	11	331					1421	20		253	.07	1.0	
6	50					19.99	40			.97		11	11	11	11	331					1421	20		30.7	.08	1.8	
7	51					20.30	42			.97		11	11	11	11	331					1421	20		27.2	.07	.25	
8	52					20.55	44			.97		11	11	11	11	331					1421	20		251	.04	.29	
9	53					20.73	46			.97		11	11	11	11	331					1421	20		258	.05	.34	
10	54					21.04	48			.97		11	11	11	11	331					1421	22		30.4	.07	.41	
11	55					21.38	48			.97		11	11	11	11	331					1421	22		191	.09	.50	
12	56					21.66	50			.97		11	11	11	11	331					1421	22		329	.07	.57	
13	57					21.94	52	70		.97	.97	11	11	11	11	331					1421	22		285	.05	.62	
14	58					22.13	54	70		.97	.97	11	11	11	11	331					1421	22		294	.04	.66	
15	59					22.37	54	70		.97	.97	11	11	11	11	331	11				1421	22		16.7	.08	.74	
16	60					22.55	56	70		.97	.97	11	11	11	11	331					1421	22		24.9	.02	.76	
17	61					22.78	56	70		.97	.97	11	11	11	11	331					1421	22		17.3	.08	.84	
																					1421	22		360.4		.97	

RED MAPLE PULPWOOD TREE OF LOW VIGOR									
1	45	2	2	21	05	9.30			
2	46					9.30			
3	47					9.40			
4	48					9.40			
5	49					9.48			
6	50					9.51			
7	51					9.58			
8	52					9.64			
9	53					9.67			
10	54					9.71			
11	55					9.78			
12	56					9.79			
13	57					9.81			
14	58					9.82			
15	59					9.82			
16	60					9.83			
17	61					9.87			
							REPEATER	OR	SURVIVOR
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MEAS. NO.	MEAS. YR.	FOREST NO.	PLOT NO.	TREE NO.	SPECIES	D.B.H.	SAWLOG	CORDWOOD	USABLE LENGTH	SOUNDNESS	VIGOR.	QUAL.	TREE STAGE	PREVIOUS	PRESENT	SG. VIGOR	AGE	KIND	MORTALITY	COVER TYPES	SIZE CLASS	DBH CLASS	GROWTH	VOLUME	BD. FT. OR CORDWOOD	BA. GROWTH	BASAL AREA
1	45	2	7	9	11	230.0	42			.97	11	11	11	031	031	11	2301	24	2301	24	494.4	—	289				
2	46					231.0	42			.97	11	11	11	331	331	11	2301	24	2301	24	498.9	—	291				
3	47					234.0	42			.97	11	11	11	331	331	11	2301	24	2301	24	512.8	—	299				
4	48					236.0	42			.97	11	11	11	331	331	11	2301	24	2301	24	521.4	—	304				
5	49					239.0	42			.97	11	11	11	331	331	11	2301	24	2301	24	535.8	—	312				
6	50					241.1	42			.97	11	11	11	331	331	11	2301	24	2301	24	544.6	—	317				
7	51					243.2	42			.97	11	11	11	331	331	11	2301	24	2301	24	554.0	—	322				
8	52					245.4	42			.97	11	11	11	331	331	11	2301	24	2301	24	563.2	—	328				
9	53					245.4	42			.97	11	11	11	331	331	11	2301	24	2301	24	563.2	—	328				
10	54					245.6	30	74		.97	11	11	11	331	331	11	2301	24	2301	24	563.2	—	328				
11	55					00.00	00	00	00	0.00	00	00	00	360	360	88	355*	2301	00	425.9	—	330					
56.32CR																											

RED OAK SAWLOG TREE OF HIGH VIGOR AND GOOD QUALITY. KILLED BY OAK WILT AT MEAS. NO. 11. LATER CUT FOR SAWLOGS.

RED OAK SAWLOG TREE.	DIED AT MEAS.	NO. 10.	NOT CUT	OR USED.
1 45 2 8 13 11	1330 12	.65	36 33	034
2 46	1330 12	.65	36 33	334
3 47	1330 12	.65	36 33	334
4 48	1340 12	.65	36 33	334
5 49	1347 12	.65	36 33	334
6 50	1350 12	.65	36 33	334
7 51	1354 12	.65	36 33	334
8 52	1370 12	.65	36 33	334
9 53	1367 12	.44	.86 36 33	334
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RED OAK SAWLOG TREE. DIED AT MEAS. NO. 10. NOT CUT OR USED.

RED MAPLE TREE OF LOW VIGOR AND POOR QUALITY.										CUT FOR SAWLOGS AT MEAS. NO. 10									
1	45	2	26	11	05	185.0	40	.78	25	33	034	1422	18	215.0	—	187			
2	46					187.0	40	.78	25	33	334	1422	18	220.4	.04	191			
3	47					190.0	40	.78	25	33	334	1422	20	228.7	.96	197			
4	48					192.0	40	.78	25	33	334	1422	20	234.1	.04	201			
5	49					193.6	40	.78	25	33	334	1422	20	239.7	.04	205			
6	50					196.0	40	.78	25	33	334	1422	20	245.0	.05	210			
7	51					197.9	40	.78	25	33	334	1422	20	250.5	.04	214			
8	52					201.0	40	.78	25	33	334	1422	20	259.1	.06	220			
9	53					203.3	40	50	.78	36	33	1422	20	264.5	.54	225			
10	54					00.00	00	00	0.00	00	00	654	1422	00	264.5CR	225CR			

RED MAPLE TREE OF LOW VIGOR AND POOR QUALITY. CUT FOR SAWLOGS AT MEAS. NO. 10

RED MAPLE		TREE OF LOW VIGOR			AND POOR QUALITY		REGRESSED FROM SAWLOG TO PULPWOOD AT MEAS. NO. 12									
1	45	2	59	18	05	115.0	18	.78	36	33	034	2421	12	32.6	—	.72
2	46					117.0	18	.78	36	33	334	2421	12	34.1	1.5	.75
3	47					119.0	18	.78	36	33	334	2421	12	35.7	1.6	.77
4	48					121.0	18	.78	36	33	334	2421	12	37.4	1.7	.80
5	49					121.9	20	.78	36	33	334	2421	12	41.3	3.9	.81
6	50					123.8	22	.65	36	33	334	2421	12	38.8	2.5 CR	.84
7	51					125.6	22	.65	36	33	334	2421	12	40.6	1.8	.87
8	52					128.0	24	.65	36	33	334	2421	12	45.4	4.8	.89
9	53					130.0	24	.65	36	33	334	2421	14	47.5	2.1	.92
10	54					132.8	26	.65	36	33	334	2421	14	54.0	6.5	.97
11	55					135.2	26	.65	36	33	334	2421	14	56.3	2.3	.99
12	56					135.9			36	00	324	2421	14	—	56.3 CR	1.01
13	57					137.4	40		.65	36	00	224	14	192	—	1.02
14	58					138.7	40		.65	36	00	224	14	198	.006	1.05
15	59					139.7	40		.65	36	00	224	14	201	.003	1.07
16	60					140.9	40		.65	36	00	224	14	204	.003	1.08
17	61					142.3	40		.65	36	00	224	14	207	.003	1.10
															.015	.38

REGRESSIVE

GROWTH COMPONENTS N.L. 107

RED MAPLE TREE OF LOW VIGOR AND POOR QUALITY. REGRESSED FROM SAWLOG TO PULPWOOD AT MEAS. NO. 12

MEAS. NO.	MEAS. YR.	FOREST NO.	PLOT NO.	TREE NO.	SPECIES	D.B.H.	SAWLOG	CORDBOOD	SOUNDNESS	VIGOR.	QUAL.	TREE STATE	PREVIOUS	AGE	KIND	MORTALITY	COVER TYPES	SIZE CLASS	STAND DENSITY	DBH CLASS	GROWTH	BD. FT. OR CORDWOOD	VOLUME	B.A. GROWTH	BASAL AREA
RED OAK SAWLOG TREE OF LOW VIGOR AND POOR QUALITY. REGRESSED TO CHEMICAL WOOD AT MEAS. NO. 12																									
1	45	2	54	20	11	23.60	16		.97	36	33	034					1322	24				237.9		30.4	
2	46					23.80	16		.97	36	33	334					1322	24			4.6	242.5		.05	
3	47					24.10	16		.97	36	33	334					1322	24			6.9	249.4		.08	
4	48					24.20	16		.97	36	33	334					1322	24			2.2	251.6		.02	
5	49					24.38	16		.97	36	33	334					1322	24			4.8	256.4		.06	
6	50					24.65	16		.97	36	33	334					1322	24			4.4	260.8		.05	
7	51					24.80	16		.97	36	33	334					1322	24			4.9	265.7		.06	
8	52					24.96	16		.97	36	33	334					1322	26			5.0	270.7		.05	
9	53					25.16	16		.97	36	33	334					1322	26			4.8	275.5		.05	
10	54					25.37	16		.97	36	33	334					1322	26			5.0	280.5		.06	
11	55					25.60	16		.97	36	33	334					1322	26			4.8	285.3		.05	
12	56					25.74				36	00	394					1322	26			28.53 CR		.03		
13	57					25.87				36	00	994					1322	26				.810		.06	
14	58					26.03			0.65	36	00	994					1322	26			0.07	.817		.03	
15	59					26.15			0.65	36	00	994	3				1322	26			.014	.831		.05	
16	60					26.29			0.65	36	00	994					1322	26			0.06	.837		.03	
17	61					26.50			0.65	36	00	994					1322	26			0.14	.851		.06	
																					0.41			.79	

BUR OAK TREE OF CULL VIGOR. DIED AT MEAS. NO. 9																								
1	45	2	71	11	47	30.30				44	44	047					1422	30						5.01
2	46					30.30				44	44	447					1422	30						5.01
3	47					30.30				44	44	447					1422	30						5.01
4	48					30.30				44	44	447					1422	30						5.01
5	49					30.43				44	44	447					1422	30						5.04
6	50					30.37				44	44	447					1422	30						5.04
7	51					30.60				44	44	447					1422	30						5.11
8	52					30.60				44	44	447					1422	30						5.11
9	53					00.00	00	00	0.00	00	00	450					1422	00			13.11 CR			5.11 CR

RED MAPLE SAWLOG TREE OF LOW VIGOR AND POOR QUALITY. REGRESSED TO CHEMICAL CULL AT MEAS. NO. 10 AND MEAS. NO. 16																								
1	45	2	37	11	05	15.00	30		.65	36	33	034					2322	16				84.0		1.23
2	46					15.00	30		.65	36	33	334					2322	16			0.0	84.0		1.23
3	47					15.10	30		.65	36	33	334					2322	16			1.4	85.4		.01
4	48					15.10	30		.65	36	33	334					2322	16			0.0	85.4		.02
5	49					15.17	30		.65	36	33	334					2322	16			1.4	86.8		.02
6	50					15.31	30		.65	36	33	334					2322	16			1.6	88.4		.02
7	51					15.45	30		.65	36	33	334					2322	16			1.4	89.8		.01
8	52					15.60	30		.65	36	33	334					2322	16			3.0	92.8		.04
9	53					15.82	30		.65	36	33	334					2322	16			2.9	95.7		.03
10	54					16.00				36	00	394					2322	16			11.7			.04
11	55					16.16				36	00	994					2322	16						.03
12	56					16.38				36	00	994					2322	16						.04
13	57					16.70				36	00	994					2322	16						.05
14	58					16.91				36	00	994					2322	16				.337		.04
15	59					17.17				36	00	994					2322	16			0.08	.345		.04
16	60					17.41				36	00	994					2322	18			0.13	.358		.05
17	61					17.69				36	00	994					2322	18			0.21	.358 CR		.04
										36	00	994					2322	18			0.21	.586		.06
										36	00	994					2322	18			0.21			.48

WHITE OAK TREE WAS CULLED AT MEAS. NO. 1. CONSIDERED COMMERCIAL SAWLOG AT MEAS. NO. 2. DIED AT MEAS. NO. 4.																								
1	45	2	999	8	45	22.36	32		1.00	44	44	047					4331	22						2.74
2	46					22.38	32		1.00	44	44	447					4331	22						2.74
3	47					22.44	32		.65	36	33	434					4331	22						2.74
4	48					00.00	00		0.00	00	00	350					4331	00						2.74 CR